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2010, and ASHRAE 127–2007. Manufacturers may optionally specify a “break-in” period, not to exceed 20 hours, to operate the equipment under test prior to conducting the test method specified by AHRI 210/240–2008, AHRI 340/360–2007, AHRI 390–2003, AHRI 1230–2010, or ASHRAE 127–2007 (incorporated by reference, see § 431.95). A manufacturer who elects to use an optional compressor break-in period in its certification testing should record this information (including the duration) in the test data underlying the certified ratings that is required to be maintained under 10 CFR 429.71.

(d) *Refrigerant line length corrections for tests conducted using AHRI 1230–2010.* For test setups where it is physically impossible for the laboratory to use the required line length listed in Table 3 of the AHRI 1230–2010 (incorporated by reference, see § 431.95), then the actual refrigerant line length used by the laboratory may exceed the required length and the following correction factors are applied:

Piping length beyond minimum, X (ft)	Piping length beyond minimum, Y (m)	Cooling capacity correction %
0 > X ≤ 20	0 > Y ≤ 6.1	1
20 > X ≤ 40	6.1 > Y ≤ 12.2	2
40 > X ≤ 60	12.2 > Y ≤ 18.3	3
60 > X ≤ 80	18.3 > Y ≤ 24.4	4
80 > X ≤ 100	24.4 > Y ≤ 30.5	5
100 > X ≤ 120	30.5 > Y ≤ 36.6	6

(e) *Additional provisions for equipment set-up.* The only additional specifications that may be used in setting up the basic model for test are those set forth in the installation and operation manual shipped with the unit. Each unit should be set up for test in accordance with the manufacturer installation and operation manuals. Paragraphs (e)(1) through (3) of this section provide specifications for addressing key information typically found in the installation and operation manuals.

(1) If a manufacturer specifies a range of superheat, sub-cooling, and/or refrigerant pressure in its installation and operation manual for a given basic model, any value(s) within that range may be used to determine refrigerant charge or mass of refrigerant, unless the manufacturer clearly specifies a rating value in its installation and op-

eration manual, in which case the specified rating value shall be used.

(2) The air flow rate used for testing must be that set forth in the installation and operation manuals being shipped to the commercial customer with the basic model and clearly identified as that used to generate the DOE performance ratings. If a rated air flow value for testing is not clearly identified, a value of 400 standard cubic feet per minute (scfm) per ton shall be used.

(3) For VRF systems, the test set-up and the fixed compressor speeds (*i.e.*, the maximum, minimum, and any intermediate speeds used for testing) should be recorded and maintained as part of the test data underlying the certified ratings that is required to be maintained under 10 CFR 429.71.

(f) *Manufacturer involvement in assessment or enforcement testing for variable refrigerant flow systems.* A manufacturer’s representative will be allowed to witness assessment and/or enforcement testing for VRF systems. The manufacturer’s representative will be allowed to inspect and discuss set-up only with a DOE representative and adjust only the modulating components during testing in the presence of a DOE representative that are necessary to achieve steady-state operation. Only previously documented specifications for set-up as specified under paragraphs (d) and (e) of this section will be used.

[77 FR 28989, May 16, 2012]

ENERGY EFFICIENCY STANDARDS

§ 431.97 Energy efficiency standards and their compliance dates.

(a) All basic models of commercial package air-conditioning and heating equipment must be tested for performance using the applicable DOE test procedure in § 431.96, be compliant with the applicable standards set forth in paragraphs (b) through (f) of this section, and be certified to the Department under 10 CFR part 429.

(b) Each commercial air conditioner or heat pump (not including single package vertical air conditioners and single package vertical heat pumps, packaged terminal air conditioners and

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packaged terminal heat pumps, computer room air conditioners, and variable refrigerant flow systems) manufactured on and after the compliance date listed in the corresponding table

must meet the applicable minimum energy efficiency standard level(s) set forth in Tables 1, 2, and 3 of this section.

TABLE 1 TO § 431.97—MINIMUM COOLING EFFICIENCY STANDARDS FOR AIR-CONDITIONING AND HEATING EQUIPMENT

[Not including single package vertical air conditioners and single package vertical heat pumps, packaged terminal air conditioners and packaged terminal heat pumps, computer room air conditioners, and variable refrigerant flow multi-split air conditioners and heat pumps]

Equipment type	Cooling capacity	Sub-category	Heating type	Efficiency level	Compliance date: products manufactured on and after . . .
Small Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled, 3 Phase)	<65,000 Btu/h	AC HP	All All	SEER = 13 SEER = 13	June 16, 2008. June 16, 2008.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled)	≥65,000 Btu/h and <135,000 Btu/h.	AC HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.2 EER = 11.0	January 1, 2010. January 1, 2010.
Large Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled)	≥135,000 Btu/h and <240,000 Btu/h.	AC	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.0 EER = 10.8	January 1, 2010. January 1, 2010.
Heating Equipment (Air-Cooled).	>240,000 Btu/h	HP	No Heating or Electric Resistance heating. All Other Types of Heating.	EER = 10.6 EER = 10.4	January 1, 2010. January 1, 2010.
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled)	≥240,000 Btu/h and <760,000 Btu/h.	AC HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 10.0 EER = 9.8	January 1, 2010. January 1, 2010.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled, Evaporatively-Cooled, and Water-Source).	<17,000 Btu/h ≥17,000 Btu/h and <65,000 Btu/h.	AC HP AC HP	All All All All	EER = 12.1 EER = 11.2 EER = 12.1 EER = 12.0	October 29, 2003. October 29, 2003. October 29, 2003. October 29, 2003.
	≥65,000 Btu/h and <135,000 Btu/h.	AC	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.5 EER = 11.3	October 29, 2003. ¹ October 29, 2003. ¹
Large Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled, Evaporatively-Cooled, and Water-Source).	≥135,000 Btu/h and <240,000 Btu/h	HP AC HP	All All All	EER = 12.0 EER = 11.0 EER = 11.0	October 29, 2003. ¹ October 29, 2004. ² October 29, 2004. ²
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled, Evaporatively-Cooled, and Water-Source).	≥240,000 Btu/h and <760,000 Btu/h.	AC HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.0 EER = 10.8	January 10, 2011. ² January 10, 2011. ²
		HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.0 EER = 10.8	January 10, 2011. ² January 10, 2011. ²

¹ And manufactured before June 1, 2013. See Table 3 of this section for updated efficiency standards.

² And manufactured before June 1, 2014. See Table 3 of this section for updated efficiency standards.

TABLE 2 TO § 431.97—MINIMUM HEATING EFFICIENCY STANDARDS FOR AIR-CONDITIONING AND HEATING EQUIPMENT
[Heat pumps]

Equipment type	Cooling capacity	Efficiency level	Compliance date: Products manufactured on and after . . .
Small Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled, 3 Phase).	<65,000 Btu/h	HSPF = 7.7	June 16, 2008.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled).	≥65,000 Btu/h and	COP = 3.3 ..	January 1, 2010.
Large Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled).	<135,000 Btu/h	COP = 3.2 ..	January 1, 2010.
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled).	≥135,000 Btu/h and	COP = 3.2 ..	January 1, 2010.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Water-Source).	<240,000 Btu/h	COP = 4.2 ..	October 29, 2003.
	≥240,000 Btu/h and		
	<760,000 Btu/h		

TABLE 3 TO § 431.97—UPDATES TO THE MINIMUM COOLING EFFICIENCY STANDARDS FOR WATER-COOLED AND EVAPORATIVELY-COOLED AIR-CONDITIONING AND HEATING EQUIPMENT

Equipment type	Cooling capacity	Heating type	Efficiency level	Compliance date: Products manufactured on and after . . .
Small Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled).	≥65,000 Btu/h and <135,000 Btu/h.	No Heating or Electric Resistance Heating.	EER = 12.1	June 1, 2013.
Large Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled).	≥135,000 Btu/h and <240,000 Btu/h.	All Other Types of Heating	EER = 11.9	June 1, 2013.
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled).	≥240,000 Btu/h and <760,000 Btu/h.	No Heating or Electric Resistance Heating.	EER = 12.5	June 1, 2014.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Evaporatively-Cooled).	≥65,000 Btu/h and <135,000 Btu/h.	All Other Types of Heating	EER = 12.3	June 1, 2014.
Large Commercial Packaged Air-Conditioning and Heating Equipment (Evaporatively-Cooled).	≥135,000 Btu/h and <240,000 Btu/h.	No Heating or Electric Resistance Heating.	EER = 12.4	June 1, 2014.
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Evaporatively-Cooled).	≥240,000 Btu/h and <760,000 Btu/h.	All Other Types of Heating	EER = 12.2	June 1, 2014.
		No Heating or Electric Resistance Heating.	EER = 12.1	June 1, 2013.
		All Other Types of Heating	EER = 11.9	June 1, 2013.
		No Heating or Electric Resistance Heating.	EER = 12.0	June 1, 2014.
		All Other Types of Heating	EER = 11.8	June 1, 2014.
		No Heating or Electric Resistance Heating.	EER = 11.9	June 1, 2014.
		All Other Types of Heating	EER = 11.7	June 1, 2014.

(c) Each packaged terminal air conditioner (PTAC) and packaged terminal heat pump (PTHP) manufactured on or after January 1, 1994, and before October 8, 2012 (for standard size PTACs and PTHPs) and before October 7, 2010 (for non-standard size PTACs and PTHPs) must meet the applicable minimum energy efficiency standard level(s) set

forth in Table 4 of this section. Each PTAC and PTHP manufactured on or after October 8, 2012 (for standard size PTACs and PTHPs) and on or after October 7, 2010 (for non-standard size PTACs and PTHPs) must meet the applicable minimum energy efficiency standard level(s) set forth in Table 5 of this section.

TABLE 4 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR PTAC AND PTHP

Equipment type	Cooling capacity	Efficiency level	Compliance date: products manufactured on and after . . .
PTAC	<7,000 Btu/h	EER = 8.88	January 1, 1994.
	≥7,000 Btu/h and <15,000 Btu/h.	EER = 10.0—(0.16 × Cap ¹)	January 1, 1994.
PTHP	≥15,000 Btu/h	EER = 7.6	January 1, 1994.
	<7,000 Btu/h	EER = 8.88	January 1, 1994.
		COP = 2.72	

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TABLE 4 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR PTAC AND PTHP—Continued

Equipment type	Cooling capacity	Efficiency level	Compliance date: products manufactured on and after . . .
	≥7,000 Btu/h and <15,000 Btu/h.	EER = 10.0—(0.16 × Cap ¹) COP = 1.3 + (0.16 × EER ²)	January 1, 1994.
	≥15,000 Btu/h	EER = 7.6 COP = 2.52	January 1, 1994.

¹ “Cap” means cooling capacity in thousand Btu/h at 95 °F outdoor dry-bulb temperature.

² The applicable minimum cooling EER prescribed in this table.

TABLE 5 TO § 431.97—UPDATED MINIMUM EFFICIENCY STANDARDS FOR PTAC AND PTHP

Equipment type	Cooling capacity	Sub-category	Efficiency level	Compliance date: Products manufactured on and after . . .
PTAC	Standard Size	<7,000 Btu/h	EER = 11.7	October 8, 2012.
		≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 13.8 — (0.3 × Cap ¹)	October 8, 2012.
	Non-Standard Size	>15,000 Btu/h	EER = 9.3	October 8, 2012.
		<7,000 Btu/h	EER = 9.4	October 7, 2010.
		≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 10.9 — (0.213 × Cap ¹).	October 7, 2010.
		>15,000 Btu/h	EER = 7.7	October 7, 2010.
PTHP	Standard Size	<7,000 Btu/h	EER = 11.9 COP = 3.3	October 8, 2012.
		≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 14.0 — (0.3 × Cap ¹) COP = 3.7 — (0.052 × Cap ¹).	October 8, 2012.
	Non-Standard Size	>15,000 Btu/h	EER = 9.5 COP = 2.9	October 8, 2012.
		<7,000 Btu/h	EER = 9.3 COP = 2.7	October 7, 2010.
		≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 10.8 — (0.213 × Cap ¹).	October 7, 2010.
		>15,000 Btu/h	COP = 2.9 — (0.026 × Cap ¹).	October 7, 2010.
			EER = 7.6 COP = 2.5	October 7, 2010.

¹ “Cap” means cooling capacity in thousand Btu/h at 95 °F outdoor dry-bulb temperature.

(d) Each single package vertical air conditioner and heat pump manufactured on or after January 1, 2010, must meet the applicable minimum energy efficiency standard level(s) set forth in this section.

TABLE 6 TO § 431.97 MINIMUM EFFICIENCY STANDARDS FOR SINGLE PACKAGE VERTICAL AIR CONDITIONERS AND SINGLE PACKAGE VERTICAL HEAT PUMPS

Equipment type	Cooling capacity	Sub-category	Efficiency level	Compliance date: Products manufactured on and after . . .
Single package vertical air conditioners and single package vertical heat pumps, single-phase and three-phase.	<65,000 Btu/h	AC HP	EER = 9.0 EER = 9.0 COP = 3.0	January 1, 2010. January 1, 2010.
Single package vertical air conditioners and single package vertical heat pumps.	≥65,000 Btu/h and <135,000 Btu/h.	AC HP	EER = 8.9 EER = 8.9 COP = 3.0	January 1, 2010. January 1, 2010.
Single package vertical air conditioners and single package vertical heat pumps.	≥135,000 Btu/h and <240,000 Btu/h.	AC HP	EER = 8.6 EER = 8.6 COP = 2.9	January 1, 2010. January 1, 2010.

(e) Each computer room air conditioner with a net sensible cooling capacity less than 65,000 Btu/h manufactured on or after October 29, 2012, and

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each computer room air conditioner with a net sensible cooling capacity greater than or equal to 65,000 Btu/h manufactured on or after October 29, 2013, must meet the applicable minimum energy efficiency standard level(s) set forth in this section.

TABLE 7 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR COMPUTER ROOM AIR CONDITIONERS

Equipment type	Net sensible cooling capacity	Minimum SCOP efficiency		Compliance date: Products manufactured on and after . . .
		Downflow unit	Upflow unit	
Computer Room Air Conditioners, Air-Cooled.	<65,000 Btu/h	2.20	2.09	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.10	1.99	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	1.90	1.79	October 29, 2013.
Computer Room Air Conditioners, Water-Cooled.	<65,000 Btu/h	2.60	2.49	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.50	2.39	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	2.40	2.29	October 29, 2013.
Computer Room Air Conditioners, Water-Cooled with a Fluid Economizer.	<65,000 Btu/h	2.55	2.44	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.45	2.34	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	2.35	2.24	October 29, 2013.
Computer Room Air Conditioners, Glycol-Cooled.	<65,000 Btu/h	2.50	2.39	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.15	2.04	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	2.10	1.99	October 29, 2013.
Computer Room Air Conditioner, Glycol-Cooled with a Fluid Economizer.	<65,000 Btu/h	2.45	2.34	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.10	1.99	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	2.05	1.94	October 29, 2013.

(f) Each variable refrigerant flow air conditioner or heat pump manufactured on or after the compliance date listed in this table must meet the applicable minimum energy efficiency standard level(s) set forth in this section.

TABLE 8 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR VARIABLE REFRIGERANT FLOW MULTI-SPLIT AIR CONDITIONERS AND HEAT PUMPS

Equipment type	Cooling capacity	Heating type ¹	Efficiency level	Compliance date: Products manufactured on and after . . .
VRF Multi-Split Air Conditioners (Air-Cooled).	<65,000 Btu/h	All	13.0 SEER	June 16, 2008.
	≥65,000 Btu/h and <135,000 Btu/h.	No Heating or Electric Resistance Heating.	11.2 EER	January 1, 2010.
		All Other Types of Heating.	11.0 EER	January 1, 2010.
	≥135,000 Btu/h and <240,000 Btu/h.	No Heating or Electric Resistance Heating.	11.0 EER	January 1, 2010.
		All Other Types of Heating.	10.8 EER	January 1, 2010.
	≥240,000 Btu/h and <760,000 Btu/h.	No Heating or Electric Resistance Heating.	10.0 EER	January 1, 2010.
VRF Multi-Split Heat Pumps (Air-Cooled)		All Other Types of Heating.	9.8 EER	January 1, 2010.
	<65,000 Btu/h	All	13.0 SEER	June 16, 2008.
	≥65,000 Btu/h and <135,000 Btu/h.	No Heating or Electric Resistance Heating.	7.7 HSPF	
			11.0 EER	January 1, 2010.
			3.3 COP	

TABLE 8 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR VARIABLE REFRIGERANT FLOW MULTI-SPLIT AIR CONDITIONERS AND HEAT PUMPS—Continued

Equipment type	Cooling capacity	Heating type ¹	Efficiency level	Compliance date: Products manufactured on and after . . .
VRF Multi-Split Heat Pumps (Water-Source)* * *	≥135,000 Btu/h and <240,000 Btu/h.	All Other Types of Heating.	10.8 EER	January 1, 2010.
		No Heating or Electric Resistance Heating.	3.3 COP 10.6 EER	January 1, 2010.
	≥240,000 Btu/h and <760,000 Btu/h.	All Other Types of Heating.	10.4 EER	January 1, 2010.
		No Heating or Electric Resistance Heating.	3.2 COP 9.5 EER	January 1, 2010.
	<17,000 Btu/h	All Other Types of Heating.	9.3 EER	January 1, 2010.
		Without heat recovery.	3.2 COP 12.0 EER	October 29, 2012.
	≥17,000 Btu/h and <65,000 Btu/h.	With heat recovery ..	4.2 COP	October 29, 2003.
		All	11.8 EER	October 29, 2012.
	≥65,000 Btu/h and <135,000 Btu/h.	Without heat recovery.	4.2 COP	October 29, 2003.
		All	12.0 EER	October 29, 2003.
	≥135,000 Btu/h and <760,000 Btu/h.	Without heat recovery.	12.0 EER	October 29, 2003.
		With heat recovery ..	4.2 COP 10.0 EER	October 29, 2013.

¹ VRF Multi-Split Heat Pumps (Air-Cooled) with heat recovery fall under the category of "All Other Types of Heating" unless they also have electric resistance heating, in which case it falls under the category for "No Heating or Electric Resistance Heating."

[77 FR 28991, May 16, 2012, as amended at 77 FR 76830, Dec. 31, 2012]

Subpart G—Commercial Water Heaters, Hot Water Supply Boilers and Unfired Hot Water Storage Tanks

SOURCE: 69 FR 61983, Oct. 21, 2004, unless otherwise noted.

§ 431.101 Purpose and scope.

This subpart contains energy conservation requirements for certain commercial water heaters, hot water supply boilers and unfired hot water storage tanks, pursuant to Part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6317.

[69 FR 61983, Oct. 21, 2004, as amended at 70 FR 60415, Oct. 18, 2005]

§ 431.102 Definitions concerning commercial water heaters, hot water supply boilers, and unfired hot water storage tanks.

The following definitions apply for purposes of this subpart G, and of subparts J through M of this part. Any

words or terms not defined in this section or elsewhere in this part shall be defined as provided in section 340 of the Act, 42 U.S.C. 6311.

ASTM-D-2156-80 means the test standard published in 1980 by the American Society of Testing and Measurements and titled Method for Smoke Density in Flue Gases from Burning Distillate Fuels.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Hot water supply boiler means a packaged boiler that is industrial equipment and that,

(1) Has an input rating from 300,000 Btu/hr to 12,500,000 Btu/hr and of at least 4,000 Btu/hr per gallon of stored water,